

CAAM 336

DIFFERENTIAL EQUATIONS IN SCIENCE AND ENGINEERING

Fall 2019 · Rice University

Lectures:	Sect 001 (Bencomo), MWF 1:00 p.m.-1:50 p.m., DCH 1064 Sect 002 (Protasov), MWF 9:00 a.m.-9:50 a.m., DCH 1042
Instructor:	Mario Bencomo (mjb6@rice.edu) Office hours: Tuesday 1:00 p.m.-1:50 p.m. and Thursday 4:00 p.m.-4:50 p.m., DCH 3022
Instructor:	Anastasiya Protasov (anastasiya.n.protasov@rice.edu) Office hours: Mon 10:00 a.m.-10:50 a.m. and Wed 12:00 p.m.-12:50 p.m., DCH 3085
Teaching assistant:	Rami Masri (rami.masri@rice.edu) Office hour: TBD, DCH 2108 Recitation: TBD, DCH (Recitations start the second week)
Webpage:	https://canvas.rice.edu/courses/22807

Course outline: This course introduces several numerical approaches to solving partial differential equations. Spectral and finite element methods will be discussed in details using the heat and wave equations. These techniques will rely on some foundations of abstract mathematical ideas including vector spaces, inner products, bases of orthonormal eigenvectors, projections, etc. Upon completing this course, students should be able to obtain exact and/or approximated solutions to partial differential equations. Moreover, MATLAB codes may be programmed in order to compute and visualize approximated solutions.

Prerequisites: CAAM 210 (Introduction to Engineering Computation) and MATH 212 (Multivariable Calculus), or permission of the instructor. Less formally: you should be able to write elementary MATLAB programs, and be comfortable with vector calculus and basic vector and matrix operations.

Text: Mark S. Gockenbach: *Partial Differential Equations: Analytical and Numerical Methods*, SIAM, Philadelphia, 2011, 2nd edition.

Absence Policy: Students are strongly encouraged to contribute to our class community by attending and participating in lectures. If you can not attend a lecture, please find another student in the class who can communicate what material was covered. Class participation and improving performance on the exams will be considered when assigning borderline grades.

Grade Policy: Homework will account for 40% of the final grade. The lowest homework grade will be dropped. There are three equally weighted scheduled exams.

Homework: Homework is due by 9am (Sect 002) or 1pm (Sect 001) at class on Friday. Homework contains both theoretical and computational problems. Students are strongly encouraged to start their homework early. Mathematically rigorous solutions are expected; strive for clarity and elegance. Collaboration on problem sets is strongly suggested, however your write-up must be your own independent work. Transcribed solutions and copied MATLAB code are both unacceptable. You may not consult solutions from previous sections of this class. No internet or other resources are allowed unless specified. Homework is assigned via the CANVAS site.

Late Policy: Problem sets are due **no later** than 1pm on the posted due date. Assignments turned in after this time **will not be accepted** and will receive a score of **0%**. In exceptional circumstances, contact the instructor as soon as possible: we adhere to Student Health's Note policy.

Honor Code: It is an honor code violation to turn in code or solutions which have, in all or in part, been copied from another student. It is also an honor code violation to consult solutions from previous sections of this class.

Any student with a disability requiring accommodation in this course is encouraged to contact the instructor during the first week of class, and also to contact Disability Support Services in the Ley Student Center.